STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

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MEMORANDUM TO: Project Engineers
Project Design Engineers

FROM: T. V. Rountree, P. E.
State Bridge Design Engineer

DATE: October 18, 2001

SUBJECT: DIFFERENTIAL DEFLECTIONS

The tributary area method of computing deflections due to the weight of the slab is not always an accurate predictor of the deflections that occur in the field. Therefore, a more refined method of computing deflections due to the weight of the slab may be required for simple span steel plate girder bridges.

Whenever the deflections between adjacent simple span plate girders differ by more than 1" (25 mm) using the tributary area method, a more refined analysis method will be required. If construction is staged, compare adjacent girders within the same stage. Differential deflections of greater than 1" (25 mm) will most likely occur between the two girders closest to the closure pour but within the same stage of a staged bridge; however, they may also occur between an interior and exterior girder in any long span whether or not the bridge is staged.

The analysis method chosen must take into account the effect of the diaphragms on the stiffness and relative deflection of the girders. A two-dimensional STAAD model is a more accurate method for determining these deflections. This model is reliable for bridges with skews between 45° and 135° and is available from the Engineering Development Squad for all in-house squads. For bridges outside this skew range, additional work (i.e., three-dimensional STAAD model, DESCUS, etc.) will be necessary.

If differential deflections between adjacent girders are less than 1" (25 mm), use of the tributary area method remains sufficient. This policy is effective immediately. The Design Manual will be updated at a later date.

TVR/JAD/

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